# **UNIVERSITI TEKNOLOGI MARA**

### STUDY ON THE COCRYSTAL FORMATION OF IBUPROFEN AND OXALIC ACID VIA EVAPORATION METHOD

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#### ABSTRACT

Co-crystallization is the process where the combination of two compound which are active pharmaceutical ingredient (API) compound with the co-former by the noncovalent interaction. This process is believed that it can enhanced the physicochemical properties of the API including solubility, stability, dissolution rate, melting point and its bioavailability. Due to this, the research for the co-crystallization of the Ibuprofen and oxalic acid had conducted as it co-former by using the slow evaporation method. The analyzation and characterization of this co-crystal had conducted by using the optical microscope, Fourier transform infrared spectroscopy (FT-IR), differential scanning calorimeter (DSC) and X-ray diffraction (XRD). The observation using optical microscope had shown that the cocrystal grew in the dendrite and rod shape. From the characterization of the cocrystals in FTIR, it shows the shift of peak which can be shown the cocrystal structure had performed. Then, the DSC showed that the melting point of cocrystals were higher than the pure ibuprofen. This showed that the cocrystal had higher thermodynamic stability than the pure its API. The characterization of the IBP:OA cocrystal by using the XRD had proved that there are new crystallographic structure formed by comparing it with the pure compound. These results showed the cocrystals had formed.

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### CHAPTER 1

#### INTRODUCTION

#### **1.1 Research Background**

This research is a study on the co-crystallization of ibuprofen and oxalic acid by evaporation technique. The co-crystallization is the two molecules of active pharmaceutical ingredient (API) combine together by a noncovalent interaction. (Sabiruddin Mirza I. M., 2008) In this research, the co-crystal ibuprofen form with the conformer. The conformer which is oxalic acid is used in this research. The oxalic acid is an organic compound that is colorless crystalline solid.

The co-crystal also known as the supramolecular heterosynthon. The supramolecular is many of complex molecules held together by the noncovalent bond such as hydrogen bond, ionic interactions, van der Waals interactions and Π-interactions. The hydrogen bond is formed by the interaction of the nitrogen with the hydrogen molecules. While the heterosynthon is the intermolecular interaction between the distinct components. The co-crystallization of the API is believed that it can enhance the physicochemical properties to make a better API. The crystal form is tended to be more stable in purification than another solid forms such as amorphous. The dissolution rate and intrinsic solubility of different crystal or the API gives different values that can influence the bioavailability of the co-crystal.